Claims (Amended)

1. (Deleted)

2. (Deleted)

3. (Deleted)

4. (Amended) A mass spectrometry system comprising:

a microchip which has a channel through which a sample passes and a sample separation area being provided in said channel;

a light irradiation unit irradiating with a laser beam while moving a light irradiation position along said sample separation area; and

an analytical unit analyzing a fragment of said sample to obtain mass spectrometric data, said fragment of said sample being generated by a light irradiation,

wherein said channel is provided on a surface of a substrate, said sample separation area has a plurality of columnar bodies, and

said sample separation area having said columnar bodies is irradiated with said laser beam.

5. The mass spectrometry system according to claim 4, wherein said sample separation area includes a plurality of columnar body arrangement portions in which said plurality of columnar bodies are arranged, and a path is provided between said adjacent columnar body arrangement portions, said sample passing through said path.

6. The mass spectrometry system according to claim 5, wherein a width of said path is larger than an average interval between said

columnar bodies in said columnar body arrangement portion.

7. The mass spectrometry system according to claims 5 or 6, wherein said plurality of columnar body arrangement portions are combined and arranged such that a plane arrangement is to be a substantial rhombus, and said columnar bodies are arranged such that said plane arrangement of each of said columnar body arrangement portions is to be a substantial rhombus.

8. The mass spectrometry system according to claim 4, wherein the density of said plurality of columnar bodies is gradually decreased toward a proceeding direction of said sample in said channel.

9. The mass spectrometry system according to claim 4, wherein the density of said plurality of columnar bodies is gradually increased toward a proceeding direction of said sample in said channel.

10. The mass spectrometry system according to any one of claims 4 to 9, wherein said sample separation area and an adjustment area are alternately formed with respect to a proceeding direction of said sample in said channel, said columnar bodies being formed less densely in said adjustment area than in said sample separation area.

11. The mass spectrometry system according to any one of claims 4 to 10, whrerein a metal layer is provided on a surface of said

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columnar body.

12. The mass spectrometry system according to any one of claims 4 to 10, wherein said columnar body is made of metal.

13. (Amended) The mass spectrometry system according to any one of claims 4 to 12, wherein said laser beam is an infrared laser beam or an ultraviolet laser beam.

14. (Amended) A mass spectrometry system comprising:

a microchip which has a channel through which a sample passes and a sample separation area being provided in said channel;

a light irradiation unit irradiating with a laser beam while moving a light irradiation position along said sample separation area; and

an analytical unit analyzing a fragment of said sample to obtain mass spectrometric data, said fragment of said sample being generated by a light irradiation,

wherein said sample separation area has a plurality of concaves, and said conave is a hole provided in said channel.

15. (Amended) The mass spectrometry system according to claim 14, wherein said channel is provided on a surface of a substrate,

a projecting portion is provided in said sample separation area, and

said plurality of concaves are provided from a channel wall to said projecting portion at a predetermined pitch.

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16. (Amended) The mass spectrometry system according to claims 14 or 15, wherein said concave is formed in a metal oxide coating layer which is provided on a surface of said channel by an anodic oxidation process.

17. (Amended) The mass spectrometry system according to any one of claims 4 to 16, wherein a surface of an inner wall of said channel is hydrophilized.

18. The mass spectrometry system according to claim 17, wherein said inner wall of said channel is hydrophilized by a hydrophilic substance adhered to said surface of said inner wall of said channel.

19. The mass spectrometry system according to claim 17, wherein said inner wall of said channel is hydrophilized by forming a silicon thermal oxide film on a surface of said channel.

20. (Amended) The mass spectrometry system according to any one of claims 4 to 16, wherein a surface of an inner wall of said channel is water repellent treated.

21. (Amended) A mass spectrometry system comprising:

a microchip which has a channel through which a sample passes and a sample separation area being provided in said channel;

a light irradiation unit irradiating with a laser beam while moving a light irradiation position along said sample separation

area; and

an analytical unit analyzing a fragment of said sample to obtain mass spectrometric data, said fragment of said sample being generated by a light irradiation,

wherein a surface of said sample separation area has a plurality of first areas and a second area, said first areas being arranged while separated from one another, said second area occupying said surface of said sample separation area except for said first areas, and one of said first area and said second area is a hydrophobic area and the other is a hydrophilic area.

22. The mass spectrometry system according to claim 21, comprises a plurality of said sample separation areas.

23. The mass spectrometry system according to claim 22, wherein said plurality of sample separation areas are arranged in a stripe shape.

24. The mass spectrometry system according to any one of claims 21 to 23, wherein said hydrophobic area is formed by a film containing a compound having a hydrophobic group.

25. The mass spectrometry system according to claim 24, wherein said compound having said hydrophobic group is a silane coupling agent having a hydrophobic group.

26. The mass spectrometry system according to claim 24, wherein

said compound having said hydrophobic group is a silicone compound.

27. The mass spectrometry system according to any one of claims 21 to 24, wherein said hydrophobic area is formed by bringing a polydimethylsiloxane block into contact with a surface of said channel which is hydrophilic.

28. The mass spectrometry system according to any one of claims 21 to 24, whrerein said hydrophobic area is formed by printing a liquid silicone compound onto a surface of said channel which is hydrophilic.

29. The mass spectrometry system according to any one of claims 21 to 28, wherein said sample separation area is formed by providing a mask having an opening on at least a part of a surface of said channe, depositing a compound having a hydrophobic group via said opening on said surface of said channel, and removeing said mask, said hydrophobic area being arranged in said sample separation area.

30. The mass spectrometry system according to any one of claims 21 to 29, wherein said hydrophilic area is constituted of a film containing a compound having a hydrophilic group.

31. The mass spectrometry system according to claim 30, wherein said compound having said hydrophilic group is a silane coupling agent having a hydrophilic group.

32. The mass spectrometry system according to any one of claims 21 to 31, wherein said sample separation area is formed by providing a mask having an opening in at least a part of said surface of said channel, depositing a compound having a hydrophilic group via said opening on said surface of said channel, and removing said mask, said hydrophilic area being arranged in said sample separation area.

33. (Amended) The mass spectrometry system according to any one of claims 4 to 32, whererin said plurality of channels are provided and a liquid sample introducing channel intersecting said channels is provided.

34. (Amended) The mass spectrometry system according to claim 33, wherein between said sample separation area and a part where said channel and said liquid sample introducing channel intersect each other,

a pillar mesh through which a molecule having a predetermined size passes is provided, and

said pillar mesh is formed by arranging a plurality of columnar bodies.

35. (Amended) The mass spectrometry system according to any one of claims 4 to 34, further comprising a damming portion in which columnar bodies are arranged in a line and the sample is condensed in a band shape.

36. (Amended) The mass spectrometry system according to claim 35,

wherein said damming portion is arranged adjacent to said sample separation area to separate said sample in said sample separation area, said sample being condensed in the band shape.

37. (Amended) The mass spectrometry system according to any one of claims 4 to 36, wherein said sample separation area is divided into a plurality areas through a slit.

38. (Amended) The mass spectrometry system according to any one of claims 4 to 37, further comprising an external force applying unit applying external force to said sample to move said sample in said channel.

39. (Amended) The mass spectrometry system according to claim 38, said channel being provided on a surface of a substrate, further comprising:

a plurality of liquid reservoirs communicated with said channel provided on the surface of said substrate;

a conduction path provided in the vicinity of said liquid reservoir and on said substrate; and

an electrode provided from a wall surface of said liquid reservoir to said conduction path and pressure-bonded onto said conduction path,

wherein said external force is electric force applied between said plurality of liquid reservoirs.

40. (Amended) The mass spectrometry system according to claim 38,

further comprising:

a liquid reservoir provided in a part of said channel;

a joint portion formed by a combination of a male joint and a female joint and provided in said liquid reservoir; and

a piping tube communicated with said liquid reservoir through said joint portion,

wherein pressure is applied to insides of said piping tube, said joint portion, and said liquid reservoir by said external force applying unit.

41. (Amended) The mass spectrometry system according to any one of claims 4 to 37, wherein a micro channel is formed in said sample separation area, and said sample is introduced from said channel to said sample separation area through said micro channel by capillary phenomenon.

42. (Amended) The mass spectrometry system according to any one of claims 4 to 41, wherein a cover including a matrix for mass spectrometry and formed in a thin film shape is provided on an upper portion of said channel.

43. A mass spectrometry system comprising:

a substrate;

a sample separation area in which sample adsorption particles adhere to said substrate to develop a sample according to a specific property;

a light irradiation unit irradiating with a laser beam while

moving a light irradiation position along said sample separation area; and

an analytical unit analyzing a fragment of said sample to obtain mass spectrometric data, a fragment of said sample being generated by a light irradiation.

44. The mass spectrometry system according to claim 43, wherein said sample adsorption particles are silica gels.

45. The mass spectrometry system according to claims 43 or 44, wherein said analytical unit includes a data memory unit, in which said light irradiation position and said mass spectrometric data corresponding to said light irradiation position are stored while associated with each other.

46. (Deleted)

47. (Amended) A method of analysis in which a mass spectrometric analysis is performed with the use of a microchip having a sample separation area, comprising:

a step of separating a sample in said sample separation area according to a specific property of said sample;

a step of irradiating with a laser beam while moving a light irradiation position along said sample separation area; and

a step of analyzing a fragment of said sample to obtain mass spectrometric data, said fragment of said sample being generated by a light irradiation;

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a step of obtaining a first mass spectrometric data, said step of obtaining said first mass spectrometric data including a step of depolymerizing said sample after said step of separating a sample;

a step of analyzing a fragment of said sample to obtain a second mass spectrometric data by performing said step of irradiating with a laser beam without performing said step of depolymerizing said sample after said step of separating a sample, said fragment of said sample being generated by a light irradiation; and

a step of identifying said sample based on said first mass spectrometric data and said second mass spectrometric data.

48. (Amended) The method according to claim 47,

said sample separation area having an immobilizing layer including a compound having an epoxy group, further comprising:

a step of immobilizing said separated sample to said sample separation area with said compound prior to said step of irradiating with a laser beam after said step of separating a sample.

49. (Amended) The method according to claims 47 or 48, further comprising a step of spraying a matrix for mass spectrometry onto said sample separation area by using pressure of nebulizer gas or voltage prior to step of irradiating with a laser beam after said step of separating a sample.

50. (Deleted)

51. (Amended) A method of analysis in which a mass spectrometric

analysis is performed with the use of a microchip having a sample separation area, comprising:

a step of developing a sample in said sample separation area according to a specific property of said sample;

a step of irradiating with a laser beam while moving a light irradiation position along said sample separation area; and

a step of analyzing a fragment of said sample to obtain mass spectrometric data, said fragment of said sample being generated by a light irradiation;

a step of obtaining a first mass spectrometric analysis data, said step of obtaining said first mass spectrometric data including a step of depolymerizing said sample after said step of developing a sample;

a step of analyzing a fragment of said sample to obtain a second mass spectrometric analysis data by performing said step of irradiating with a laser beam without performing said step of depolymerizing said sample after said step of developing a sample, said fragment of said sample being generated by a light irradiation; and

a step of identifying said sample based on said first mass spectrometric data and said second mass spectrometric data.

52. (Amended) The method according to claim 51,

said sample separation area having an immobilizing layer including a compound having an epoxy group, further comprising:

a step of immobilizing said developed sample to said sample separation area with said compound prior to said step of irradiating

with a laser beam after said step of separating a sample.

53. (Amended) The method according to claims 51 or 52, further comprising a step of spraying a matrix for mass spectrometry onto said sample separation area by using pressure of nebulizer gas or voltage prior to step of irradiating with a laser beam after said step of separating a sample.

54. (Added) The mass spectrometry system according to any one of claims 4 to 42,

wherein said analytical unit includes a data memory unit, in which said light irradiation position and said mass spectrometric analysis data corresponding to said light irradiation position are stored while associated with each other.

55. (Added) The mass spectrometry system according to any one of claims 4 to 42,

wherein said sample separation area separates said sample according to a molecular weight, an isopotential point, or a surface hydrophobic property of said sample, and

said light irradiation unit irradiates with said laser beam while moving said light irradiation position along said sample separated in said sample separation area.